

Physics 517/617 Experiment 5 Operational Amplifiers

Basic Experiment - Physics 517/617

- 1) Measure the voltage gain vs frequency for an inverting amplifier (*Simpson*, pg. 413) with a gain of 20 db, 40 db, and 60 db. Scan the frequency range 10 Hz (or as low as you can go) to 100 KHz. Plot all measurements on a Bode plot. Compare your results with the bandwidth discussion of Section 6.4.1 and Figure 6.13 in *Meyer*.
- 2) Build and measure a summing amplifier. The input voltages can be AC or DC. DC circuits have to be treated carefully by balancing the + and – input impedance (see discussion in http://www.play-hookey.com/analog/experiments/basic_op_amp_inverter.html).
- 3) Build and measure an integrating circuit or differentiating circuit.
- 4) Build and measure one other operational amplifier circuit of your own choosing (not from above). There are many choices in Shertz, *Simpson* or *Horowitz and Hill*. (e.g. twin-t, ideal diode, comparator, peak detector, or anything else). Many practical circuit designs are available on OpAmp manufacturer's web sites (see below).

Example OP Amp Circuits can be found at:

<http://hyperphysics.phy-astr.gsu.edu/hbase/electronic/opampvar.html>

<http://www.national.com/an/AN/AN-31.pdf>

<http://www.ti.com/lit/an/snla140a/snla140a.pdf>

Advanced Experiment - Physics 617

- 5) Build and measure the phase-shift oscillator:

http://en.wikipedia.org/wiki/Phase-shift_oscillator

Choose the output frequency of your oscillator as 5 KHz.